June 21, 1966 W. THAL ETAL 3,256,581

APPARATUS FOR CREATING DESIGNS IN PILE FABRICS

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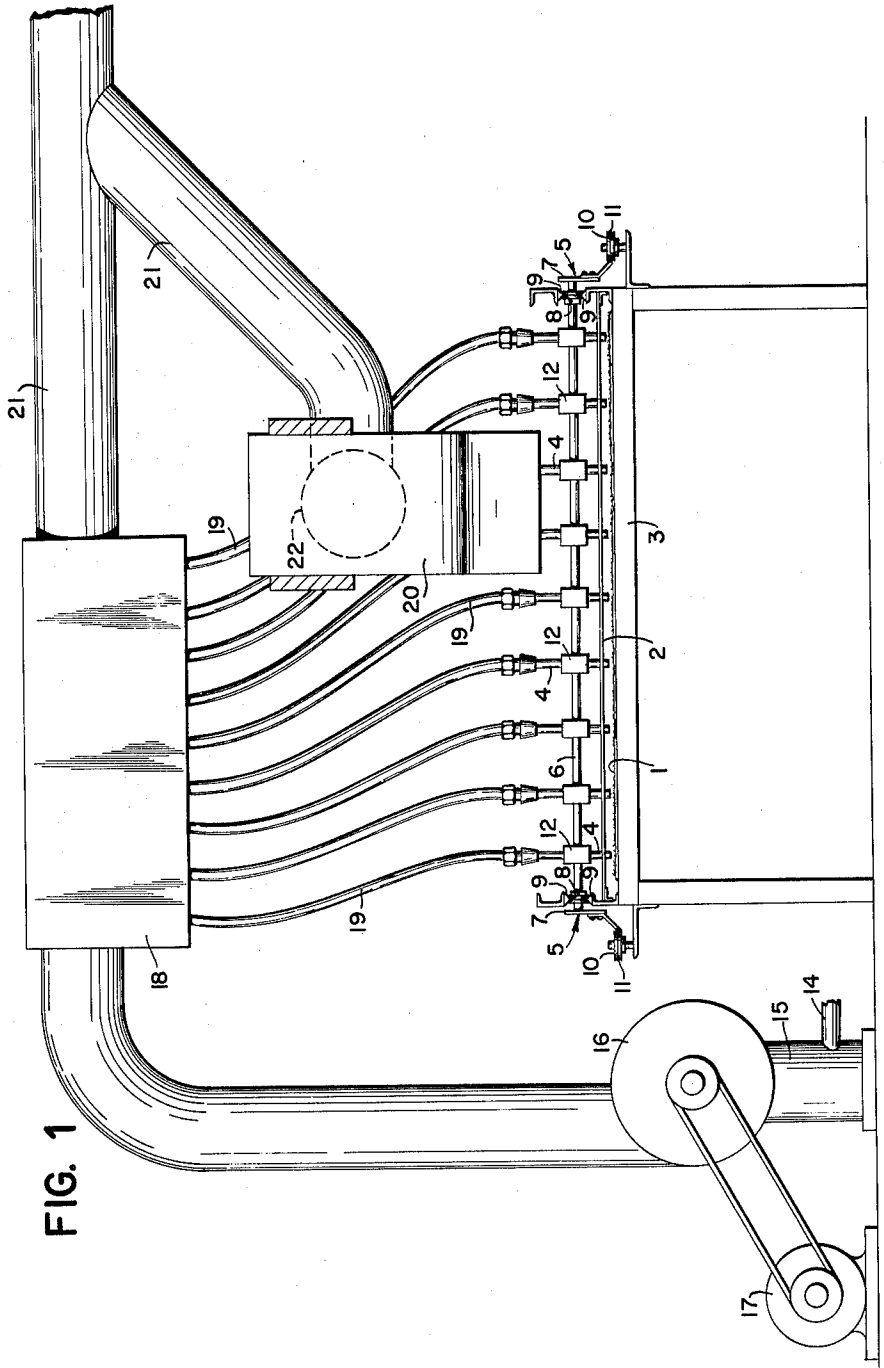


FIG. 1

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FIG. 2

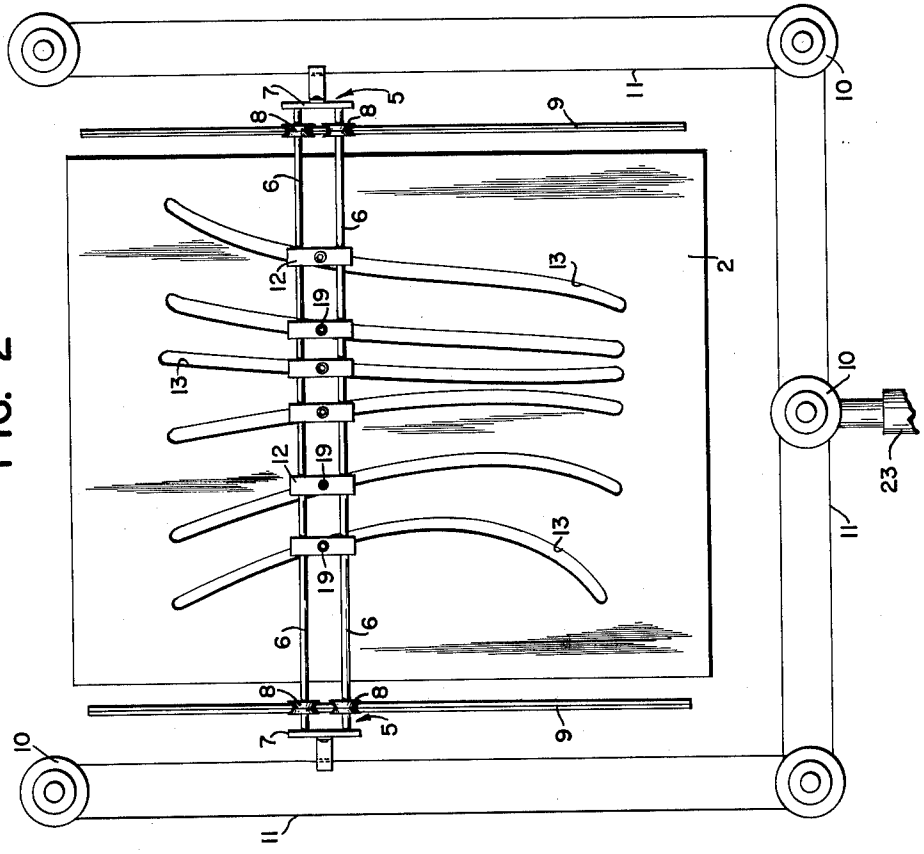
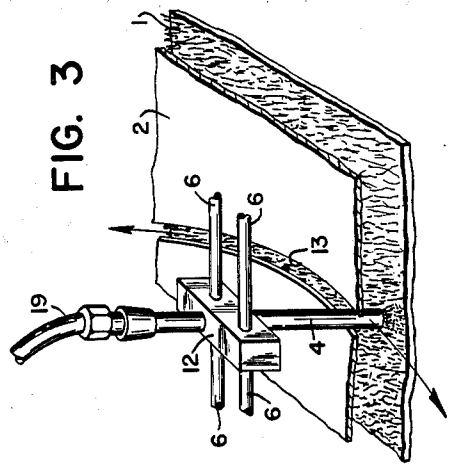


FIG. 3



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FIG. 4

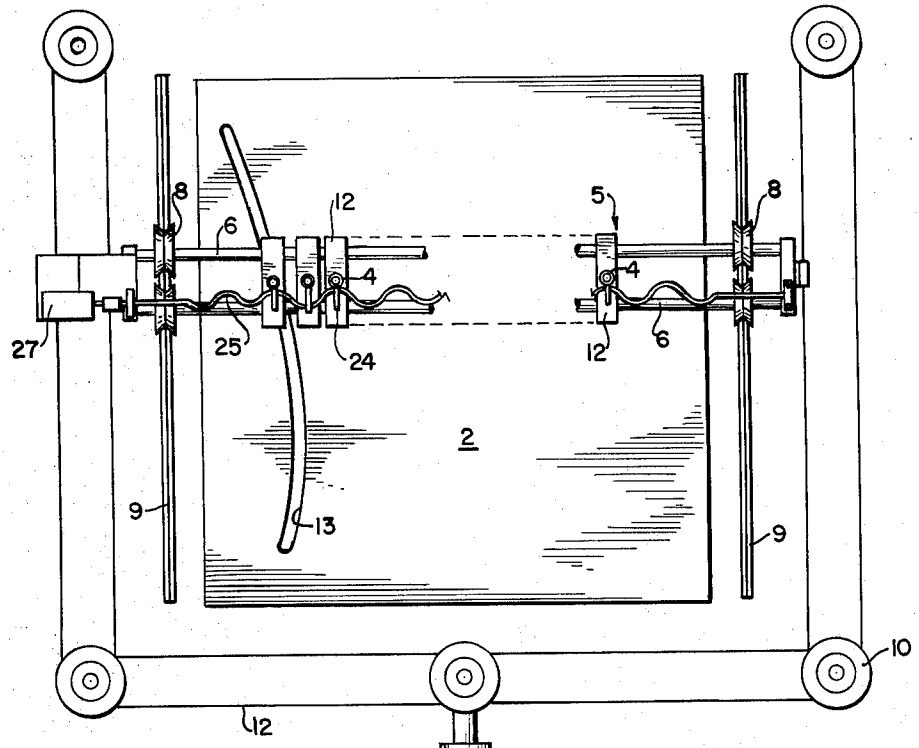


FIG. 5

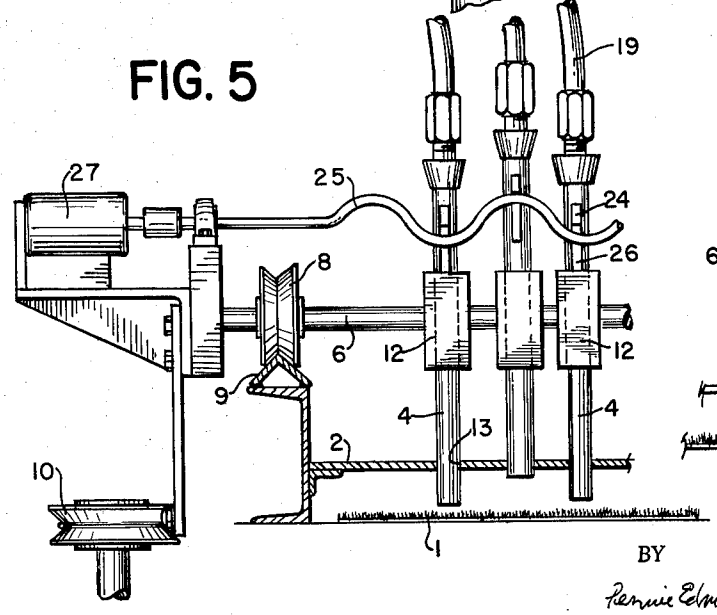
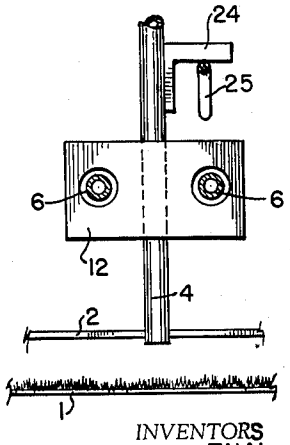


FIG. 6



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APPARATUS FOR CREATING DESIGNS IN PILE FABRICS

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Filed Jan. 7, 1964, Ser. No. 339,059
4 Claims. (Cl. 26—2)

This application is a continuation-in-part of application Serial No. 61,149, filed October 7, 1960, and now abandoned.

This invention relates to apparatus used in the treatment of fabrics and more particularly to apparatus used for treatment of pile fabrics in accordance with the processes disclosed in United States patent application, Ser. No. 853,947, filed November 18, 1959, by William Thal and assigned to Alamac Knitting mills, Inc., now U.S. Patent No. 3,010,179, issued November 28, 1961 and application Ser. No. 152,870, filed November 16, 1961, now U.S. Patent No. 3,171,484.

An object of the invention is to provide an apparatus for treating fabrics which includes novel means for positioning and controlling fluid discharging nozzles.

The apparatus heretofore used for treating fabrics consisted of one or more nozzles permanently mounted in fixed relation to one another. The fabric treated by such apparatus would be conveyed past these nozzles and a fluid would flow from the nozzles and impinge on the moving fabric. Prior to the invention of William Thal, referred to above, jets of fluids were used to treat fabrics by kinetically disturbing and heating the fibers. The relative movement between the discharging nozzles and the fabric was important only for the purposes of ensuring uniform treatment over the entire fabric. William Thal discovered that the application of jets of fluids to the face of pile fabrics could be used to affect the fibers in such a way as to cause patterns or designs to be formed on the face of the fabric. Thus, in the practice of his invention limited relative motion between the mutually-fixed nozzles and the fabric is important in creating desired patterns and designs. The present invention is directed to providing additional directions of relative movement to obtain heretofore unobtainable patterns and designs.

Apparatus heretofore used was limited in the pattern or design that it could create by the fixed position of the nozzles and by the uni-directional relative movement between the nozzles and the fabric conveyor. In order to obtain such more complicated patterns and designs as might be required for garments, carpets, and the like, it was necessary for various sections of treated pile fabrics to be cut up and then sewed together in new configurations.

The present invention relates to apparatus which accomplishes the treatment of pile fabric by a system of movable fluid discharging nozzles which cause a relatively complicated design or pattern to be formed directly on a specific area of fabric. It is also a feature of the present invention that the jets are not fixed relative to one another but the spacing of the jets may be varied during the treatment of the fabric.

A preferred embodiment of this invention is directed towards the treatment of pile fabrics used as simulated furs. The manufacture of a natural fur coat requires the attachment of numerous pelts in specific patterns. One

such pattern is known as the "flare" or "let-out" effect. This pattern has a herringbone appearance. The pattern is accomplished by the addition of rows of attached pelts to that portion of fabric which would become the lower part of the coat. The finished coat has a bell-shape in that the lower part of the coat has an increasingly larger diameter. This desirable pattern is created in the manufacture of a natural fur coat by the proper attachment of numerous fur pelts. In prior apparatus nozzles equally spaced and fixed relative to one another could only produce straight and equally spaced rows of simulated attached pelts whether the nozzles or the fabric or both be moved in space to produce movement relative to one another. In the manufacture of a simulated fur coat this desired pattern which simulates the attachment of natural fur pelts including the areas between the pelts and which further simulates the actual texture of natural fur can now be created by the use of the apparatus of the preferred embodiment.

This embodiment is more easily understood by reference to the drawings. In the drawings:

FIG. 1 is an elevation view of the fabric treating apparatus.

FIG. 2 is a plan view of that section of the apparatus through the flexible tubes. The fluid supply and exhaust system and the two top V-shaped rails are not shown.

FIG. 3 is a perspective cut-away showing the end of a nozzle being guided in the contour of a guide plate slot as it discharges fluid upon the surface of a pile fabric.

FIG. 4 is a plan view of a modification of the fabric treating apparatus showing a section taken through the flexible tubes. The feed supply and exhaust system and the two top V-shaped rails are not shown.

FIG. 5 is a partial elevation view showing a selected nozzle moved to a raised position by interaction of a cam shaft and risers mounted on the nozzles.

FIG. 6 is a partial elevation view showing the engagement of the cam shaft with the cam lifters mounted on the nozzles.

A description of the embodiment in relation to FIGURES 1, 2 and 3 is as follows:

A section of pile fabric **1** substantially equal in width and length to the guide plate **2** rests on the stand **3** and under the guide plate **2**. The back of the fabric rests on the stand and the face of the fabric is exposed to the nozzles **4**.

A carriage **5** consists of two rods **6** mounted parallel to one another on end pieces **7**. The carriage is supported by four flanged wheels **8** which travel on and between two pair of V-shaped rails **9**. The carriage is driven back and forth on the rails by an arrangement of pulleys **10** and wires **11** and driving mechanism **23**.

Slidably positioned on the carriage rods **6** are a plurality of nozzle mountings **12**. Nozzles **4** are positioned in and through and are permanently attached to the mountings **12**. The lower ends of the nozzles **4** as positioned extend down through the guide plate **2** and the ends are guided in the slots **13** of the guide plate. The nozzles **4** and their slidable mountings **12** move along the carriage rods **6** in response to the guiding action of the slots **13** with the nozzle ends.

The nozzles **4** are supplied with heated fluid by means of a burner **14**, combustion chamber **15**, blower **16**, blower drive motor **17**, conduit manifold **18** and flexible tubes **19**. The fluid then passes through the nozzles **4** and impinges on the fabric **1**. An exhaust system including a

hood 20, ducts 21 and exhaust blower 22 removes excess fluid from the fabric face and conduit manifold.

Directing attention to FIGS. 4, 5 and 6 which illustrate an alternate embodiment in accordance with the invention, it is seen that the nozzles 4 are slidably mounted in nozzles mountings 12 to permit the nozzles to be moved up and down relative to the fabric being treated by the apparatus. Cam lifters 24 are positioned on the upper portion of nozzles 4 for engagement with a rotatable cam 25 mounted on the carriage 5 such that the raising of selected cam lifters causes the selected nozzles to move upward and away from the fabric. When movement of the cam releases a lifter the nozzle drops down until its lifter engages the top surface of the nozzle mounting. The purpose of causing selected nozzles to be moved up and down is to vary the characteristic of the fluid jet emitted from the nozzle. For example, as a nozzle is raised the area acted upon by the jet is increased in width and as the nozzle is lowered its effective width is reduced.

As described above the nozzle mountings 12 which carry the nozzles 4 are mounted on a carriage 5. The nozzles interact with slots 13 in a guide plate 2 (one representative slot being shown on FIG. 4) to move the nozzle mountings relative to each other as the carriage moves back and forth. As the nozzles 4 move in turn relative to one another in the horizontal plane, the cam lifters 24 will move relative to the rotatable cam 25 thus producing additional variations in the height of the selected nozzles above the pile fabric.

The cam lifters 24 also serve to limit the downward movement of the nozzles as shown by engagement of risers 24 with their associated mountings 12 at points 26. The rotatable cam 25 is driven by cam drive means 27. The design of the cam, the control of the cam rotation, and the selection of nozzles to be raised and lowered is determined by the pattern or design to be formed in the pile fabric.

The operation of the apparatus of the preferred embodiment as shown in FIGS. 1, 2 and 3 is as follows. A section of pile fabric is placed face up on the stand 3 and under the guide plate 2. The carriage 5 is then driven by the driving means to either end of the rails 9 (as limited by the length of the slots 13). The next step is starting the fluid supply system. Once fluid jets of desired characteristics such as temperature and velocity are being discharged from the nozzles the carriage 5 is driven at any desired speed to the other end of its travel on the rails. During the movement of the carriage, the exterior surfaces of the lower ends of the nozzles bear against the interior surfaces of the guide plate slots 13 causing the nozzles along with their mountings to slide on the carriage rods 6.

Operation of the alternate embodiment of the invention which includes the arrangement for producing variable vertical movement of selected nozzles as shown in FIGS. 4, 5 and 6 is similar to the operation described above; however, in addition, a cam drive means 27 actuates a rotatable cam 25 of particular design to effect the desired vertical movement of selected nozzles during the movement of the carriage 5 back and forth over the fabric to be treated while at the same time the nozzles 4 are moving relative to one another along the longitudinal axis of carriage 5 as described above. The operation of this embodiment provides for movement of the nozzles in selected patterns in planes parallel to the fabric.

Any suitable combination of pulley and wires and driving means may be employed to drive the carriage on the tracks. It is also to be understood that the contour of the slots shown in FIG. 2 do not necessarily represent a complete set but are only illustrative. Particular slot arrangements will immediately suggest themselves to those skilled in this art.

Although there has been shown and described herein a preferred form of the invention, it is to be understood that the invention is not necessarily confined thereto, and that any change or changes in the structure of and in the relative arrangement of components thereof are contemplated as being within the scope of the invention as defined by the claims appended hereto.

We claim:

1. An apparatus for treating pile fabrics comprising a carriage, a plurality of nozzle mountings slidably positioned on said carriage, a plurality of fluid discharge nozzles slidably mounted in and supported by said nozzle mountings, means for reciprocating said carriage and nozzles relative to a pile fabric to be treated, means for slidably moving said nozzles vertically in said nozzle mountings, stationary nozzle contacting and guiding means for causing predetermined variable lateral spacing of said nozzles during said reciprocation of said carriage and means for supplying fluid to the nozzles whereby a desired design in the pile fabric is created.

2. The apparatus of claim 1 in which the means for slidably moving said nozzles in said nozzle mountings in turn comprises a rotatable cam mounted on said carriage, means for rotating said cam, engagement means mounted on said nozzles for engaging with said rotatable cam whereby the rotation of said cam causes said nozzles to be moved in said nozzle mountings.

3. In an apparatus for treating a pile fabric positioned substantially in a plane, a plurality of discharge nozzles positioned in a second plane substantially parallel to and a predetermined distance from the fabric to be treated, carriage means for mounting and carrying said nozzles in the second plane, means for moving said carriage means and nozzles reciprocally in the second plane relative to a pile fabric to be treated, said nozzles slidably mounted on said carriage means to permit sliding movement of the nozzles in the second plane perpendicular to the direction of carriage movement, each of said nozzles positioned to discharge fluid in a direction perpendicular to said fabric and against the face thereof, stationary nozzle contacting and guiding means for causing each of said nozzles to move in a predetermined manner in said second plane, said contacting and guiding means including a stationary plate having a plurality of slots formed therein, each of said slots receiving and guiding one of said nozzles wherein the reciprocal movement of the carriage means causes the nozzles to move in the direction of the carriage and the contacting and guiding means causes variable spacing of said nozzles in directions perpendicular to said carriage movement to create a desired design in the face of the pile fabric.

4. In an apparatus for treating a pile fabric positioned substantially in a plane, a plurality of discharge nozzles positioned in a second plane substantially parallel to and a predetermined distance from the fabric to be treated, carriage means for mounting and carrying said nozzles in the second plane, means for moving said carriage means and nozzles reciprocally in the second plane relative to a pile fabric to be treated, said nozzles slidably mounted on said carriage means to permit sliding movement of the nozzles in the second plane perpendicular to the direction of carriage movement, each of said nozzles positioned to discharge fluid in a direction perpendicular to said fabric and against the face thereof, stationary nozzle contacting and guiding means for causing each of said nozzles to move in a predetermined manner in said second plane, said contacting and guiding means including a plurality of guiding slots, each of said guiding slots receiving and guiding one of said nozzles wherein the reciprocal movement of the carriage means causes the nozzles to move in the direction of the carriage and the contacting and the guiding means causes variable spacing of said nozzles in directions perpendicular to said carriage movement to create a desired design in the face of the pile fabric.

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